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Observations of Occultations of Stars by the Moon, 1874 and 1875, (with the deduced Equations between the Errors of the Lunar Elements); and of Phenomena of Jupiter's Satellites in 1875: made at the Radcliffe Observatory, Oxford.

(Communicated by the Radcliffe Observer.)

Occultations.

No.	Day of	Phenomenon.	Moon's	Oxford			Ob- server.
	Observation.			Limb.	Mean Solar	Time.	
	1874.			h	m	s	
1	Oct. 22	Disapp. of 27 Piscium	Dark	12	1	22.2	K
2	Dec. 16	„ 29 Piscium	„	5	34	10.1	L & K
3	19	„ π Arietis	„	11	8	27.6	K & B
	1875.						
4	Jan. 16	Disapp. of τ^2 Arietis	Dark	7	51	43.2	L & B
5	20	„ ϵ Geminorum	Imperfect	12	30	38.1	K
6	May 12	„ 37 Leonis	Dark	11	2	19.6	K & B

Notes.

1874. Oct. 22. Passing clouds made the actual moment of disappearance difficult to estimate.
Dec. 16. The disappearance was instantaneous (L. and K.).
19. The disappearance was instantaneous (K.). For an instant just before disappearing, the star became blurred, and then vanished instantaneously (B.).
1875. Jan. 16. The disappearance was instantaneous. Passing clouds (L. and B.).
20. The observation good, though both the Moon and star were faint on account of thin cloud.
May 12. The disappearance was instantaneous, and the observation good (K.). The disappearance was instantaneous (B.).

In the following table of the errors of lunar elements resulting from the occultations, the Greenwich notation is used, and the elements of the *Nautical Almanac* are used uncorrected. All the computations have been made by Mr. Main by the method given in his treatise on *Spherical and Practical Astronomy*.

The observations are referred to by the Nos. of reference given above.

1, $+ 8.97 = + 0.627 \times e - 0.778 \times f - 0.627 \times x + 0.778 \times y - 0.489 \times t$
 $+ 3.099 \times m - 0.993 \times n.$
2, $+ 7.59 = + 0.493 \times e - 0.870 \times f - 0.493 \times x + 0.870 \times y - 0.412 \times t$
 $+ 2.325 \times m - 0.963 \times n.$
3, $+ 10.47 = + 0.950 \times e - 0.086 \times f - 0.950 \times x + 0.088 \times y - 0.447 \times t$
 $+ 1.465 \times m - 0.987 \times n.$

The computations of those in 1875 are not yet completed.

F F

Phenomena of Jupiter's Satellites.

Day of Obs.	Satellite.	Phenomenon.	Instrument.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N.A. h m s	Obser- ver.
1875. April 5	I.	Trs. egr. first contact	10-ft. tel.	12 21 47.2	12 32	K
		„ bisection	„	12 24 16.8		
		„ last contact	„	12 27 16.3		
	III.	Ecl. disap. began to lose brightness	„	12 59 31.0	13 6 27.5	„
		„ final disap.	„	13 6 4.9		
12	I.	Trs. ingr. first contact	„	11 56 51.2	12 5	„
		„ bisection	„	11 58 50.9		
		„ last contact	„	12 1 20.5		
13	I.	Occ. disap. last contact	„	9 15 6.5	9 19 11.6	L
	I.	Occ. reap. last contact	„	11 33 33.3	11 34	„
20	II.	Trs. egr. first contact	„	8 36 28.9	8 43	„
		„ last contact	„	8 41 28.1		
	I.	Occ. disap. first contact	„	10 57 55.6	11 6	„
		„ bisection	„	11 0 5.2		
		„ last contact	„	11 2 34.8		
	I.	Ecl. reap. first seen	„	13 16 17.8	13 20 53.9	„
27	II.	Trs. ingr. bisection	„	8 28 8.8	8 31	K
		„ last contact	„	8 31 8.3		
	II.	Trs. egr. first contact	„	10 51 48.2	10 56	„
		„ bisection	„	10 53 47.9		
		„ last contact	„	10 55 47.6		
	I.	Occ. disap. first contact	„	12 41 30.1	12 50	„
		„ bisection	„	12 43 29.8		
		„ last contact	„	12 45 29.5		
28	I.	Trs. ingr. first contact	„	9 53 30.7	9 59	L
		„ bisection	„	9 55 20.4		
		„ last contact	„	9 57 55.0		
		„ first contact	Heliom.	9 51 40.5		B
		„ bisection	„	9 54 55.0		
		„ last contact	„	9 57 39.5		
	I.	Sh. ingr. last contact	10-ft. tel.	10 14 47.2	10 15	L
	I.	Trs. egr. first contact	„	12 0 44.8	12 11	„
		„ last contact	„	12 6 48.8		
	I.	Sh. egr. first contact	„	12 13 37.7	12 28	„
		„ last contact	„	12 20 16.6		

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Day of Obs.	Satellite.	Phenomenon.	Instrumeht.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N.A. h m s	Obser- ver.
1875.						
April 29	I.	Ecl. reap. first seen	"	9 38 34.4	9 43 12.7	K
		" full brightness	"	9 45 58.2		
May 5	I.	Trs. ingr. first contact	"	11 35 41.0	11 44	"
		" bisection	"	11 37 40.7		
		" last contact	"	11 39 40.4		
11	II.	Trs. ingr. last contact	"	13 6 18.0	12 59	L
13	I.	Occ. disap. first contact	"	10 39 26.2	10 45	K
		" bisection	"	10 41 25.9		
		" last contact	"	10 42 55.7		
	II.	Ecl. reap. first seen	"	10 56 46.8	11 4	"
		" full brightness	"	11 0 22.7		
14	I.	Trs. egr. first contact	"	9 59 44.3	10 8	L
		" last contact	"	10 4 23.5		
	I.	Sh. egr. first contact	"	10 34 58.5	10 46	"
		" last contact	"	10 39 27.8		
		" first contact Heliom.	"	10 34 18.1		
		" last contact	"	10 38 17.4		
18	III.	Occ. disap. first contact 10-ft. tel.	"	9 52 57.0	10 1	L
		" bisection	"	9 57 36.2		
		" last contact	"	10 3 55.2		
	III.	Occ. reap. last contact	"	12 10 45.4	12 9	"
	III.	Ecl. disap.	"	12 53 58.2	12 57 21.1	"
		"	"	12 54 18.1		
20	II.	Occ. disap. first contact	"	9 32 51.7	9 42	K
		" bisection	"	9 35 51.2		
		" last contact	"	9 39 5.7		
25	III.	Occ. disap. first contact	"	13 11 8.4	13 26	L
		" last contact	"	13 21 6.8		
27	II.	Occ. disap. bisection	"	11 58 46.5	12 3	K
		" last contact	"	12 1 16.1		
June 5	II.	Trs. egr. first contact	"	11 29 40.9	11 33	"
		" bisection	"	11 32 40.4		
		" last contact	"	11 35 39.9		
12	III.	Trs. ingr. first contact	"	9 58 20.9	10 7	"
		" bisection	"	10 3 20.1		
		" last contact	"	10 8 19.3		

Day of Obs.	Satellite.	Phenomenon.	Instrument.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N.A. h m s	Obser- ver.
1875. June 12	II.	Trs. ingr. first contact	„	11 25 7.0	11 26	K
		„ bisection	„	11 28 6.5		
		„ last contact	„	11 31 6.0		
23	III.	Ecl. reap. first seen	„	10 41 40.7	10 48 0.4	„
		„ full brightness	„	10 46 20.0		

Notes.

- April 5. J. III. Ecl. disapp. The satellite gradually faded to the merest point of light before finally disappearing.
12. Cloudy.
13. The phenomenon at disapp. was given as an eclipse in the *Nautical Almanac*, but it was observed as an occultation.
20. J. II. Trs. egr. The planet unsteady.
27. J. II. Trs. ingr. Cloudy.
28. The planet very tremulous as seen in the Heliometer.
- May 5. Cloudy.
- 11, and 18 Occ. reap. Clouds prevented the previous phases of the phenomenon being observed; the last contact tolerably satisfactory.
- J. III. Ecl. disap. The planet and satellites were seen only by glimpses on account of the sky, and the satellites disappeared between the two times noted.
25. Jupiter "boiling."
27. Cloudy.
- June 5. A very bad and very tremulous image of the planet.
- The initials L., K., B., are those of Mr. Lucas, Mr. Keating, and Mr. Bellamy.
- The instruments used were the Heliometer with power of 200, and the 10-foot telescope with power of 160.

On a Diaphanometer. By Captain W. de W. Abney, R.E.

Though perhaps not strictly within the field of Astronomy, I have ventured to bring before the notice of the Society this evening a small instrument which I have called a Diaphanometer, and which can also be used as a photometer. The instrument itself, in its simplest form, consists of a wedge of dark glass corrected for refraction, together with a means of placing any diaphanous or translucent substance in juxtaposition with it. A luminous body in rear enables the experimenter to judge through which part of the wedge the same intensity of light penetrates, as it does through the diaphanous body. The instrument exhibited consists of smoke-coloured wedges, moving with a rack-and-pinion motion, with a scale attached behind a face on which is placed an adjustable slit. Over these wedges can be placed a strip of the substance whose translucency is to